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ABSTRACT

This study was conducted to evaluate the usefulness of the PLATO instructional system to teach adult basic education and general educational development students basic mathematics and reading skills. The study was conducted with a control group of students who had no use of PLATO during an 18-month period, a second group of students who had less than 20 hours of PLATO in a given subject, and a third, experimental group who had more than 20 hours of PLATO instruction in a given subject. Results indicated that there was no difference in achievement levels among the three groups; that retention was perhaps somewhat better for the students who used PLATO, and that time spent in classes was much greater for the students who used PLATO. Although few conclusions could be drawn because of lack of control over the study and lack of appropriate use of the PLATO system, one possible conclusion is that mixing instructional methods, i.e., applying traditional instruction and PLATO instruction intermittently in the classes, was confusing to the students. This could account for increased time in classes for students who used the PLATO system without increasing achievement. (Author/KC)

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PLATO USE IN OKLAHOMA SKILL CENTERS
Final Report

written by

Samuel G. Wadsworth
Wm. D. Frazier
Oklahoma Vocational Research Coordinating Unit

Research Coordinating Unit
State Department of Vocational and Technical Education
1515 West Sixth Avenue, Stillwater, Oklahoma 74074

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ABSTRACT

PLATO USE IN OKLAHOMA SKILL CENTERS: FINAL REPORT

The purpose of this study was to evaluate the usefulness of the PLATO instructional system in skill center settings. The variables of concern were grade-level achievement in language, reading and mathematics, time in classes, and retention of students. The study was initially designed to include a control group of students who were in classes during the six-month period prior to installation of PLATO, an experimental group to use PLATO during the six-month period after installation, and a second experimental group to use PLATO during the next six-month period. Because of data constraints and actual use of PLATO, the study was redesigned to include in the control group all students during the eighteen-month period who had no use of PLATO. A second group consisted of those students who had less than twenty hours of PLATO in a given subject area. The third group was the experimental group who had more than twenty hours PLATO instruction in a given subject area.

Results indicated that there was no difference in achievement levels among the three groups, the retention was perhaps somewhat better for the students who used PLATO, and the time spent in classes was much greater for the students who used PLATO.

Few conclusions and recommendations could be made due to the lack of control over the study and the lack of appropriate use of the PLATO system. A possible conclusion is that mixing instructional methods, i.e., applying traditional instruction and PLATO instruction on an intermittent basis in the classes was confusing to the students. This could account for increased time in classes for students who used the PLATO system without increasing achievement.

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INTRODUCTION

The Employment and Training Division, Oklahoma State Department of Vocational and Technical Education, contracted in 1980 with the Control Data Education Company to lease hardware and software of the PLATO instructional system for one year on a trial basis. The Research Coordinating Unit was requested to initiate a research project which would evaluate the usefulness of the system at training agencies in Oklahoma City. In all, eight PLATO terminals were set up for the experiment in October, 1980. Six terminals were placed at the Oklahoma City Skill Center and two terminals were placed at Opportunities Industrialization Center.

A research design was developed to evaluate the PLATO system in terms of student achievement, efficiency of time, and student attrition. The design and conduct of the study are set forth in the project proposal reproduced in the next section of this report.

The PLATO system became operational at the two centers on October 1, 1980. The experiment was started on November 1, 1980 to allow one month for staff training. Staff from Control Data, as a part of the leasing contract, trained the local center basic education staff in use of the system and periodically monitored its use during the term of the lease. CDC staff were available at any time to advise the basic education staff when problems might occur.

The research was designed to obtain some preliminary results needed by the Center administrators in deciding on continuation of the PLATO contract beyond one year. It was recognized that a fair assessment of PLATO might not be obtainable while teaching staff were still in training on use of the system. Data collection from student groups was therefore set up in three time periods. A control group consisted of students in ABE or GED programs at the centers during the six-month period prior to installation of the PLATO terminals. One experimental group consisted of students in the ABE or GED programs during the six months, November, 1980 through April, 1981. Comparisons between this experimental group and the control group were included in an interim report to the Employment and Training Division and Center staff.

A second experimental group consisted of students in ABE or GED programs during the five-month period from May through September, 1981. It was reasoned that teaching staff would have established the system of training for use with this group of students. Results of the second experimental group compared to the control group could be used to affirm (or reject) findings of the interim report. In retrospect, our premise can be questioned. The decision was made to

discontinue use of the PLATO system before the second experimental period was over and it is doubtful that the system was ever established as a viable training system at either of the two centers.

The brevity of this report is due in large part to the use of acronyms. Several are well-known in the educational community, however, others are perhaps localisms. A list of acronyms and their definitions as applied to this report follows.

ABE	Adult basic education—primarily language, reading and mathematics
ABE Group	Those students who were in the ABE program for the purpose of gaining basic skills necessary to their success in a skill training program at the center
ABLE	"Adult Basic Learning Examination" published by Harcourt, Brace and Jovanovich
CDC	Control Data Education Company, a subsidiary of Control Data Corporation.
GED	"General Educational Development Tests" published by Educational Testing Service
GED Group	Those students enrolled in the GED program for the purpose of gaining a high school equivalency diploma
OIC	Opportunities Industrialization Center
OKCSC	Oklahoma City Skill Center
PLATO	Programed Logic for Automated Teaching Operations (a computer-based education system)
TABE	"Test of Adult Basic Education" published by McGraw-Hill

Proposal

I. Objectives

A. To conduct a field test to determine if the utilization of the PLATO System in the ABE and GED programs at OIC and OKCSC is more efficient than the current program systems and worth the cost incurred.

B. To determine if students learn at a faster rate in language and math skills when PLATO is utilized in the ABE and GED programs as evidenced by grade-level achievement and the hours necessary for the achievement.

C. To determine if the dropout rate is reduced when PLATO is utilized in the ABE and GED programs as evidenced by the dropout rate before and after the utilization of the PLATO System.

D. To determine the number of hours the PLATO System is used for ABE, GED, and for other learning activities as evidenced by the number of hours logged in each section.

II. Design

A. Field test will run concurrently at OIC and OKCSC.

B. Survey all students who enrolled in ABE or GED programs on or after April 1, 1980, and who either completed the programs or dropped out on or before October 1, 1980.*

C. Survey all students who enter the ABE or GED programs on or after October 1, 1980,* and complete the programs on or before March 31, 1982.

D. Survey all students who enter the ABE or GED programs on or after April 1, 1981, and complete the programs or drop out on or before October 1, 1982.

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*Projected operational date of PLATO System. Dates may be altered if operational dates are delayed.

E. Transition students (students who are enrolled in the ABE or GED program during the installation and initial use of the PLATO System) will not be surveyed.

F. The following information will be gathered in each survey on each student:

1. Entry grade-level in language and math skills as determined by:

a) ABLE I or ABLE II for ABE program and ABLE II or ABLE III for GED program at OIC.

b) TABE Form 4 for ABE program and GED programs at OKCSC.

2. Completion grade level in language and math skills as determined by:

a) ABLE II for ABE program and GED scores for GED programs at OIC.

b) TABE Form 3 for ABE program and GED scores for GED program at OKCSC.

3. Hours necessary to complete each program in language and math skills.

4. Whether the student dropped out or not.

5. Number of hours students used PLATO.

G. Record the total number of hours logged on PLATE for ABE subjects, GED subjects and other subjects included in the PLATO Software.

III. Impact of Study

Documentation of the usefulness of the PLATO System to the students will determine if the system is worth the cost projected to the state office.

IV. Product to Be Delivered

A. An interim report containing initial analyses of comparisons between the groups which received no PLATO treatment and the first groups which received the PLATO treatment.

B. A final report containing the documentation and recommendations to the state department staff and directors of OIC and OKCSC.

V. Personnel and Special Facilities

A. Sam Wadsworth will serve as project director and will coordinate the research effort at OIC and OKCSC.

B. OIC will furnish the data requested on the tabulation instruments concerning their students from the three time periods.

C. OKCSC will furnish the data requested on the tabulation instruments concerning their students from the three time periods.

D. The Research Unit of the state department will tabulate the results and prepare the final report.

E. Staff of the Employment and Training Division of the state department will serve as consultants throughout the project.

LIMITATIONS

Hours of Instruction - Control Group

The hours of instruction reported by OIC were by weeks. OIC only kept track of the number of weeks a student was enrolled. They did not have the number of hours of instruction a student received during the enrollment period nor did they record the number of hours in a specified subject. OKCSC reported the number of hours a student was enrolled but did not have records as to the hours spent in each subject area. Therefore, the only students which were reported as to actual hours in a subject were those enrolled in only one subject.

The lack of data reflecting the number of instruction hours a student received in a given subject made it impossible to compare the control group with the experimental group in that respect.

Hours of Instruction - Experimental Group

The reporting of the total hours of instruction and the number of hours of PLATO instruction in a subject caused confusion and may have affected the outcome of the analysis.

It was not clear whether the total hours of instruction in a subject included the PLATO instruction time or excluded PLATO instruction time. A few students were reported as having more hours of PLATO instruction time than instru time. This confusion made comparisons and analysis difficult.

Pre-Test/Post-Test Scores - Control Group and Experimental Group

OIC had only post-test scores on ABE students. GED students were not post-tested. Passing of the GED exams was evidence of success. There was no equation between GED scores and grade-level achievement.

In some cases, OKCSC and OIC reported no advancement in grade level in specific subject for a student and advancement in another subject for the same student. Due to the problems with reporting hours of instruction, it was not clear whether the student had failed to achieve or had not received instruction in that subject.

RESULTS

The purpose of this study was to test the effectiveness of the PLATO system to teach skill center students basic mathematics and reading skills necessary to their successful completion of vocational skill training. Limitations which developed during the project, particularly with regard to the validity of the data collected, make it difficult to analyze the data. Therefore, the results and conclusions should not be generalized beyond the project. Measures of the effectiveness of PLATO are only results in the setting in which the project took place.

The results are displayed in three sections. The first section lists descriptive results relating to the Oklahoma City Skill Center and displays results in the first five tables. The second section gives results from the Opportunities Industrialization Center and results are displayed in Tables VI through X. The final section contains the statistical analyses and displays results in Tables XI and XII.

Oklahoma City Skill Center Results

Enrollment and dropout data are displayed in Table I. It is interesting to note that the dropout rate increased with each succeeding group. In the ABE classes, the dropout rate increased from 27 percent in the control group to 34 percent in the Experimental Group 2. Similarly, the GED classes attrition increased from 5 to 29 percent.

The percentage of program completers using PLATO in the ABE classes dropped from 100 percent of Experimental Group 1 to only 74 percent of Group 2. The GED classes increased use of PLATO during the second experimental period when 36 percent more students used PLATO. It should be noted that the increased use of PLATO by GED students (in fact, much of the use by GED students) was not in reading, language, or mathematics programs.

Data regarding use of PLATO by the dropouts were not obtained on all groups. Percentage of users in those groups where data were obtained is consistent with percentage of users in the completer groups.

Table II displays the use of PLATO by program completers more detailed by subject area. In the ABE classes, use of PLATO increased in reading and language but decreased in math from the first to the second experimental periods. More students in GED classes in the second group used PLATO in all subject areas than did the first GED group.

TABLE I

ENROLLMENT AT OKLAHOMA CITY SKILL CENTER

	ABE Classes			GED Classes		
	Control Group	Exper. Gp 1	Exper. Gp 2	Control Group	Exper. Gp 1	Exper. Gp 2
Total Enrollment	111	68	65	74	61	35
Completers:						
Number	81	47	43	70	48	25
% of Total	73%	69%	66%	95%	71%	79%
PLATO Users	0	47	32	0	25	22
% of Completers		100%	74%		52%	88%
Dropouts:						
Number	30	21	22	4	13	10
% of Total	27%	31%	34%	5%	21%	29%
PLATO Users	0	21	0	0	7	10
% of Dropouts		100%			53%	100%

Within the experimental GED groups, "other" PLATO courseware was used by more students than any of the three topics of interest. This finding should not be interpreted to mean that GED students were not spending the most of their PLATO hours on math, reading, and language. Rather, it appears that GED students were allowed to explore other courseware--perhaps related to their expected GED testing--and several students took advantage of that opportunity.

The data in Table III show the hours the PLATO system was in use by all students. ABE students made much less use of PLATO during the second experimental period. There was a 40 percent reduction in hours of use from the first to the second experimental periods and the reduction was distributed across all three courses. GED students increased use by 75 percent from the first to the second experimental periods. Their increased use was in all courseware except math. In total use by both GED and ABE students, there was a decrease in use of 12 percent, however, the second experimental period was one month shorter. Since the time available during the second experimental period was reduced by almost 17 percent, use was actually slightly increased. The math courseware had the greatest amount of use in both time periods and, together with reading, consumed almost three-fourths of the time the PLATO system was in use.

An arbitrary calculation of time the PLATO system was available was made in order to compare use with time available for use. The system is "on-line" around the clock and the skill centers were open twelve or

TABLE II

OKLAHOMA CITY SKILL CENTER PROGRAM COMPLETERS
USE OF PLATO BY SUBJECT AREA

Classes	ABE Classes Exper. Gp 1	ABE Classes Exper. Gp 2	GED Classes Exper. Gp 1	GED Classes Exper. Gp 2
Language:				
Number Enrolled	25	16	34	24
Number Using PLATO	5	8	15	16
Percent Using PLATO	20%	50%	44%	67%
Reading:				
Number Enrolled	25	25	28	25
Number Using PLATO	18	9	10	15
Percent Using PLATO	72%	36%	36%	60%
Mathematics:				
Number Enrolled	43	39	48	26
Number Using PLATO	38	28	13	10
Percent Using PLATO	88%	72%	27%	38%
Other PLATO Courseware:				
Number Using PLATO	0	0	19	17
Percent of Completers			40%	68%

more hours each weekday. Realistically, however, the PLATO terminals were available to students only about eight hours each day. To calculate the time available was an estimation of the real situation. Experimental Group 1 had approximately 6,000 hours of PLATO instruction time available for student use, (25 weeks times 40 hours per week times 6 terminals). Experimental Group 2 had approximately 5,040 hours available for student use, (21 weeks times 40 hours per week times 6 terminals).

By definition, the students in Group 1 were those who entered the ABE or GED program on or after November 1, 1980 and completed or dropped from the program on or before April 30, 1981. Students included in Group 2 entered on or after May 1, 1981 and completed or dropped out on or before September 30, 1981. There were a number of students, perhaps as many as 25 percent, whose enrollments spanned across the two time periods or whose entry or exit from the classes was outside the time intervals. No records of PLATO use were obtained for such students, however, their uses of the PLATO terminals reduced the time available for students in the experiment.

TABLE III

HOURS OF PLATO INSTRUCTION BY SUBJECT AREA
AT THE OKLAHOMA CITY SKILL CENTER

PLATO Courseware	Experimental Group 1			Experimental Group 2			Grand Total
	ABE	GED	Total	ABE	GED	Total	
Language:							
Hours of Use	239.3	178.3	417.6	156.9	188.6	345.5	763.1
Percent of Use	13%	30%	17%	15%	18%	16%	17%
Reading:							
Hours of Use	568.6	153.2	721.8	231.0	421.4	652.4	1374.2
Percent of Use	32%	25%	30%	21%	40%	31%	30%
Mathematics:							
Hours of Use	993.4	129.4	1122.8	694.8	103.3	798.1	1920.9
Percent of Use	55%	22%	47%	64%	10%	37%	42%
Other Courseware:							
Hours of Use	0	138.7	138.7	0	337.7	337.7	476.4
Percent of Use		23%	6%		32%	16%	11%
Total Hours of Use	1801.3	599.6	2400.9	1082.7	1051.0	2106.1	4534.6

An analysis of the use of the PLATO system related to amount of time it could have been used is displayed in Table IV. The hours the student spent on the system terminal are recorded in the computer, therefore, the hours the experimental groups used is considered to be an accurate statistic. All other statistics in Table IV are estimates, however, the estimates were conservatively calculated. The adjusted percentage of use, 53 percent for Experimental Group 1 and 56 percent for Experimental Group 2, is very conservative. It does indicate that students did not take advantage of the opportunity to learn through the PLATO system.

TABLE IV

ANALYSIS OF USE OF THE PLATO SYSTEM
AT THE OKLAHOMA CITY SKILL CENTER

	Experimental Group 1	Experimental Group 2
Estimated Hours PLATO Was Available	6,000	5,040
Hours of Use by the Experimental Students	2,400.9	2,106.1
Estimated Percent of Full Utilization	40%	42%
Adjusted Hours PLATO Was Available (75%)	4,500	3,780
Adjusted Percent of Full Utilization	53%	56%

Control Data Education Company (1979) noted from studies in Maryland that adult students had advancement of 1.0 grade levels in reading achievement with approximately 21 hours of PLATO instruction in reading. Adult students advanced two grade levels in mathematics achievement after approximately 25 hours of PLATO instruction in math. Other CDC literature cited improvements after 15 or more hours of instruction.

When it became obvious that the PLATO system was not given maximum use in the Oklahoma City Skill Center, Table V was developed to show the numbers of students and the hours they spent on PLATO courses. Of the students who did use the PLATO system, only 32 percent had 20 or more hours in any one PLATO course. When that number is reduced by the 21 dropouts who had more than 20 hours in a given course, it may be seen

that less than one-fourth of the students who used PLATO had completed their program with enough PLATO instruction to make much impact in their achievement. Less than 20 percent of the experimental students enrolled in a given course had 20 or more hours of PLATO instruction in the course.

TABLE V

NUMBER OF OKLAHOMA CITY SKILL CENTER PLATO USERS
BY COURSE BY HOURS OF INDIVIDUAL USE

	ABE Classes		GED Classes			
Course/Hours	Exper. Gp 1	Exper. Gp 2	Exper. Gp 1	Exper. Gp 2	Total	Percent
Language:						
20 or more hours	5	4	3	3	15	27
10 to 20 hours	6	2	3	5	16	28
5 to 10 hours	0	2	7	5	14	25
Less than 5 hours	0	0	5	6	11	20
Reading:						
20 or more hours	13	5	2	8	28	37
10 to 20 hours	7	4	3	10	24	32
5 to 10 hours	5	0	6	4	15	20
Less than 5 hours	1	0	4	3	8	11
Mathematics:						
20 or more hours	16	15	1	1	33	30
10 to 20 hours	24	9	2	3	38	34
5 to 10 hours	8	3	3	0	14	13
Less than 5 hours	6	1	10	8	25	23
Completers with 20 or more hours in:						
Language	1	4	3	3	11	
Reading	9	5	0	4	18	
Mathematics	10	15	0	1	26	

Opportunities Industrialization Center Results

The OIC results are reported in the same format as were those of OKCSC, however, OIC had access to only two PLATO terminals and results are very limited.

Table VI lists enrollment and dropout information at OIC. No data were available on PLATO use by the dropouts. All of the completers in both experimental groups did use the PLATO system to some extent. The dropout rate for the experimental groups in relation to the control group was lower in ABE classes and higher in GED classes.

TABLE VI

ENROLLMENT AT OPPORTUNITIES INDUSTRIALIZATION CENTER

	ABE Classes			GED Classes		
	Control Group	Exper. Gp 1	Exper. Gp 2	Control Group	Exper. Gp 1	Exper. Gp 2
Total Enrollment	36	21	14	25	16	21
Completers:						
Number	25	18	13	14	7	10
% of Total	69%	86%	93%	56%	44%	48%
PLATO Users	0	18	13	0	7	10
% of Completers		100%	100%		100%	100%
Dropouts:						
Number	11	3	1	11	9	11
% of Total	31%	14%	7%	44%	56%	52%
PLATO Users	No data available					

The OIC students were not enrolled in separate courses in language and reading, nor was their use of PLATO system software for these two areas recorded separately. Table VII reports the PLATO use by the completers with language and reading combined and mathematics use separate. It is noted that ABE student use was confined to the language-reading-math software and was increased from experimental group 1 to group 2. The GED students made very little use of language-reading-math courseware with the exception of the experimental group 1 math students. They explored other courseware and fifty percent of the GED students in experimental group 2 used other courseware exclusively.

TABLE VII

OPPORTUNITIES INDUSTRIALIZATION CENTER PROGRAM
COMPLETERS USE OF PLATO BY SUBJECT AREA

	ABE Classes		GED Classes	
Classes	Exper. Gp 1	Exper. Gp 2	Exper. Gp 1	Exper. Gp 2
Language/Reading:				
Number Enrolled	5	7	7	10
Number Using PLATO	4	7	1	3
Percent Using PLATO	80%	100%	14%	30%
Mathematics:				
Number Enrolled	16	10	7	10
Number Using PLATO	15	10	7	2
Percent Using PLATO	94%	100%	100%	20%
Other PLATO Courseware:				
Number Using PLATO	0	0	4	10
Percent of Completers			25%	100%

The GED students at OIC had few hours on the PLATO basic skills. The first experimental group had 19 hours in basic skills compared to 8 hours in other courseware. The second group of GED students had almost 80 hours in other courseware, compared to 22.3 hour in basic skills. Overall, GED students had only about 41 hours PLATO use in the basic skill areas. Table VIII illustrates the declining use of PLATO for basic skills by GED students. The use of language, math, and reading by ABE students was increased despite the one-month shorter time period.

The students at OIC were observed to be making little use of the PLATO system in relation to the amount of time the system was available. This observation is similar to that of the Oklahoma City Skill Center. Table IX lists the estimated use of the system compared to the time available for use. As was the case for the OKCSC, many students were not in the experimental groups because their enrollments overlaped the time period of the two experimental groups. In addition, no records were available regarding the use of the PLATO system by the dropouts. Even so, our best estimates indicate that the system was used less than one-eighth of the time the first experimental group were enrolled and less than one-fourth of the time during the second experimental period.

Because the system was so poorly used, Table X was developed to show the amount of time individual students used the system for specific courses.

TABLE VIII

HOURS OF PLATO INSTRUCTION BY SUBJECT AREA AT OPPORTUNITIES INDUSTRIALIZATION CENTER

PLATO Courseware	Experimental Group 1 ABE	GED	Total	Experimental Group 2 ABE	GED	Total	Grand Total
Language and Reading Combined:							
Hours of Use	37.0	1.0	38.0	97.7	18.9	116.6	154.6
Percent of Use	25%	4%	22%	52%	19%	40%	33%
Mathematics:							
Hours of Use	111.0	18.0	129.0	92.0	3.4	95.4	224.4
Percent of Use	75%	67%	74%	48%	3%	33%	48%
Other Courseware:							
Hours of Use	0	8.0	8.0	0	78.9	78.9	86.9
Percent of Use		29%	4%		78%	27%	19%
Total Hours of Use	148.0	27.0	175.0	189.7	101.2	290.9	465.9

TABLE IX

ANALYSIS OF USE OF THE PLATO SYSTEM AT THE OPPORTUNITIES INDUSTRIALIZATION CENTER

	Experimental Group 1	Experimental Group 2
Estimated Hours PLATO Was Available	2,000	1,680
Hours of Use by the Experimental Students	175	290.9
Estimated Percent of Full Utilization	9%	17%
Adjusted Hours PLATO Was Available (75%)	1,500	1,260
Adjusted Percent of Full Utilization	12%	23%

TABLE X

NUMBER OF OPPORTUNITIES INDUSTRIALIZATION CENTER PLATO USERS BY COURSE AND HOURS OF INDIVIDUAL USE

	ABE Classes		GED Classes			
Course/Hours	Exper. Gp 1	Exper. Gp 2	Exper. Gp 1	Exper. Gp 2	Total	Percent
Language/Reading						
20 or more hours	1	2	0	0	3	25
10 - 19.9 hours	0	2	0	0	2	17
5 - 9.9 hours	1	1	0	0	2	17
4.9 hours or less	2	2	1	0	5	41
Mathematics:						
20 or more hours	1	1	0	0	2	8
10 - 19.9 hours	3	3	0	0	6	24
5 - 9.9 hours	5	2	1	0	7	28
4.9 hours or less	6	4	6	0	10	40

Over the eleven-month period for which records were kept, only five students at OIC had as much as 20 hours of PLATO use in a given subject area. All five were ABE students, and only two of those had 20 or more hours in math, where the large majority of students were enrolled. It is evident that the PLATO system was not used as a basic instructional tool for either language/reading or math courses.

Results of Statistical Analyses

The study was designed to test differences in achievement between control and experimental students. It was anticipated that an analysis of covariance statistic would be used to test posttest differences while controlling for other variables that might be different among the groups. Variables controlled by covariance were: pretest scores on achievement, given when the student entered the program; and the total hours spent in a given course.

Because of limitations in data collection, the analyses were conducted only on a small portion of the sample data. Control students were not included if they had received instruction in more than one class because hours of instruction in a given class were not identified for the control group. Those students in the experimental groups who had received no training through the PLATO system were placed in the control group. No student data were included in the analyses unless data were complete with regard to pretest, posttest, and hours of instruction in the subject area.

Several analyses were accomplished. Experimental Group 1 was compared to the control group. Experimental Group 2 was compared to the control group. Groups were compared by training site. All comparisons yielded similar results, therefore, only one set of analyses are presented in this report. In the results presented in Table XI, all experimental students from both sites were compared with control students from both sites on language, math, and reading achievement. The experimental students were divided into those with 20 or more hours of PLATO use in the specific subject are and those with less than 20 hours in the area. Analyses were accomplished by type of class because of the extreme differences between ABE and GED students. It is sufficient to note that there were no significant differences among the groups on any of the analyses listed in Table XI.

An objective of the study was to determine if the dropout rate would be reduced through use of the PLATO System. Chi-square analyses were used to determine the effects of PLATO on retention in the program through completion. Tables XII and XIII display results of those analyses for ABE and GED students respectively. No significant difference was disclosed in dropout rates of GED students, however, the dropout rate of students exposed to PLATO was significantly lower than that of the control students.

TABLE XI

COVARIANT ANALYSIS OF ACHIEVEMENT AMONG GROUPS

Class/Group	N	Grade Level Means Pretest	Adjusted Posttest	Prob.
ABE Language:				
Controls	41	6.2	9.2	
Less than 20 hours	10	5.9	8.6	.113
More than 20 hours	8	5.4	7.8	
ABE Reading:				
Controls	21	6.5	7.9	
Less than 20 hours	18	6.3	8.1	.507
More than 20 hours	18	6.3	7.7	
ABE Mathematics:				
Controls	65	6.0	8.8	
Less than 20 hours	66	6.1	8.4	.227
More than 20 hours	29	5.6	8.6	
GED Language:				
Controls	30	9.4	10.6	
Less than 20 hours	24	8.7	10.6	.221
More than 20 hours	6	8.6	11.2	
GED Reading:				
Controls	24	9.7	10.7	
Less than 20 hours	26	9.3	10.7	.157
More than 20 hours	10	8.2	10.2	
GED Mathematics:				
Controls	57	8.8	10.5	
Less than 20 hours	24	8.4	10.6	.122
More than 20 hours	1	8.9	8.8	

Students were enrolled in the basic education ABE classes to attain grade level achievement necessary to their success in vocational classes. The GED students' study was aimed toward passing the high school equivalency tests. One of the project objectives was to discover if the PLATO System could reduce the time in classes necessary to attain the students' objectives. Table XIV displays the average amount of time spent in each of the basic education classes by each group. The ABE mathematics students with more than 20 hours of PLATO math were the only students to compare favorable with the control students. All other groups having any amount of PLATO work also had many more hours of class instruction than did the control students.

TABLE XII

CHI-SQUARE ANALYSIS OF RETENTION IN ABE

Group	Completers	Leavers	Total
No PLATO Instruction	113	68	181
Less than 20 hours PLATO	60	8	68
More than 20 hours PLATO	46	12	58
Total	219	88	307

$X^2 = 18.3204$
Probability $< .0001$

TABLE XIII

CHI-SQUARE ANALYSIS OF RETENTION IN GED

Group	Completers	Leavers	Total
No PLATO Instruction	106	30	136
Less than 20 hours PLATO	25	8	33
More than 20 hours PLATO	27	8	35
Total	158	46	204

$X^2 = 0.0748$
Probability = .9633

TABLE XIV

PROGRAM COMPLETERS
TOTAL HOURS OF INSTRUCTION BY SUBJECT AREA

Class	Group	Number of Students	Mean Hours
ABE	Language		
	No PLATO language hours	156	12.8
	Less than 20 PLATO language hours	10	59.2
	More than 20 PLATO language hours	5	55.6
ABE	Reading		
	No PLATO reading hours	141	10.4
	Less than 20 PLATO reading hours	15	86.7
	More than 20 PLATO reading hours	15	67.2
ABE	Mathematics		
	No PLATO math hours	86	71.2
	Less than 20 PLATO math hours	60	104.7
	More than 20 PLATO math hours	25	69.2
GED	Language		
	No PLATO language hours	47	20.7
	Less than 20 PLATO language hours	24	70.1
	More than 20 PLATO language hours	6	98.3
GED	Reading		
	No PLATO reading hours	53	19.5
	Less than 20 PLATO reading hours	20	74.7
	More than 20 PLATO reading hours	4	133.5
GED	Mathematics		
	No PLATO math hours	54	44.3
	Less than 20 PLATO math hours	22	72.0
	More than 20 PLATO math hours	1	100.0

CONCLUSIONS AND RECOMMENDATIONS

The major conclusion coming out of this study is that the PLATO System was not used as a major teaching methodology during the course of the eleven month period of the experiment. The experimental groups did not receive the "treatment" anticipated by the investigators, therefore, any evaluation of the PLATO System must be limited to the result of its use as a supplementary teaching tool.

It seems obvious to the investigators that no administrator would knowingly authorize expenditures of funds representing perhaps as much as four teacher's salaries for a system of supplementary or support training services. It is just as obvious, based on the hours of use of PLATO in this project that instructors used the system only in a supplementary role to their class instruction.

It would serve no good purpose to seek fault among the instructors and the CDC training staff. It should be pointed out, however, that results such as those obtained from this study are not unique. Tatsuoka and Birenbaum (1979) noted in a study of eighth-grade algebra students using conventional and PLATO instruction, that different instructional methods apparently caused confusion among the students and adversely affected posttest scores. In the current study, experimental students averaged over twenty hours more in their respective classes than did the control students. A reasonable explanation of the grade-level posttest results is that mixture of the instructional methods did adversely affect the experimental students.

Conclusions relating to the objectives of this study must be tempered by knowledge of the way the PLATO System was used. Inferences can only be made to similar student populations in which the PLATO System would be used in a supplementary role. Given such conditions, it is concluded that PLATO does not affect the level of achievement, that it adversely affects the time necessary to achieve, and that it does favorably affect the ability of the training institution to retain students in classes.

The latter conclusion is based on the fact that students who used PLATO spent so many more hours in classes yet had equal or better (in the case of ABE students) retention rates than did control students.

This study may be noted for its lack of control over the experimental treatments and lack of control over the data collection processes. As a result of the study, however, several recommendations are made:

1. Future studies of the use of PLATO should be controlled so that students use the PLATO instructional system independently of any other instructional methods.

2. Much additional data should be obtained with regard to students in experimental and control groups, e.g., aptitudes, attitudes, student objectives, and other attributes such as sex and age. These could add much to assuring unbiased control over the type of population the students represent. This recommendation comes in part from the investigators' frustrations when analyzing the results and seeking conclusions. The adverse results may derive from a situation where all unmotivated, unruly, or dissatisfied students were assigned to the PLATO System. Because all students were not "treated" equally during the experimental periods, we have no way of knowing what situations existed.

3. CDC staff who are trainers in the PLATO System should, as a result of this and prior research, emphasis the problems that could result if PLATO is not used as the primary instructional method for those students selected to use it.

4. Administrators and instructors in a training institution where use of PLATO is contemplated should be aware of the possible adverse results if they do not wholly commit themselves to use of the system as a primary training system. Student users should have frequent interaction with the terminal, i.e., several times a week for periods long enough to provide for a continuity of instruction.

5. Testing of different delivery systems for PLATO software should be accomplished with the intent of reducing costs. This recommendation comes from the knowledge of funding problems which negated any possibility of further, more controlled tests of the value of PLATO in the Oklahoma City skill centers. One delivery might be that of "floppy disks" compatible with microcomputers. Perhaps other delivery systems could also be tested.

In conclusion, we would reiterate to the reader that results of this research are in no way conclusive because of the poor controls over the project. We would recommend that prospective users of PLATO should review the literature relating to PLATO Systems and retest the system under their own institutional setting before forming firm conclusions.

APPENDIX

DATA COLLECTION INSTRUMENTS

PLATO Project

Tabulation Sheet #1

Check One:

OIC ____
OKCSC ____

For all students who:

A. Enrolled in the ABE or GED program on or after April 1, 1980, and
B. Completed or dropped out on or before October 1, 1980.

Note:
If a student enters both programs, list the student twice (once for each program).

	Student	ABE Program	GED Program	Completed Program	Dropped Out of Program	Entry Grade Level of Language Skills	Completion Grade Level Language Skills	Hours Needed to Achieve	Entry Grade Level of Math Skills	Completion Grade Level Math Skills	Hours Needed to Achieve			
SAMPLE	i	X		X		5.0	7.0	40	5.2	7.5	40			
	ii		X	X		7.0	10.5	25	7.5	10.5	25			
	iii	X			X									
	iv		X			6.3	10.0	15	5.7	9.5	20			
	v		X		X									
	1													
	2													
	3													
	4													
	5													
	6													
	7													
	8													
	9													
	10													
	11													
	12													

PLATO Project

Tabulation Sheet #2

Check One:

OIC _____
CKCSC _____

For all students who:
A. Enrolled in the ABE or GED program on or after November 1, 1980, and
B. Completed or dropped out on or before April 31, 1981.

Note:
If a student enters both programs, list the student twice (once for each program).

	Student	ABE Program	GED Program	Completed Program	Dropped Out of Program	Entry Grade Level of Language Skills	Completion Grade Level of Language Skills	Hours Needed to Achieve	Hours Spent on PLATO Language Skills	Entry Grade Level of Math Skills	Completion Grade Level of Math Skills	Hours Needed to Achieve	Hours Spent on PLATO Math Skills	Hours Spent On PLATO Other Prog.
SAMPLE	i	X		X		4.5	7.5	35	7	5.0	7.8	35	5	2
	ii		X		X									
	iii		X	X		7.2	10.6	30	6	7.5	10.5	30	4	0
	iv	X			X									
	v	X		X		5.5	8.0	25	5	5.0	7.2	25	5	4
	1													
	2													
	3													
	4													
	5													
	6													
	7													
	8													
	9													
	10													
	11													
	12													

PLATO Project

Tabulation Sheet #3

Check One:

OIC
OKCSC _____

For all students who:

A. Enrolled in the ABE or GED program on or after May 1, 1981, and
B. Completed or dropped out on or before November 1, 1981.

Note:
If a student enters both programs, list the student twice (once for each program).

	Student	ABE Program	GED Program	Completed Program	Dropped Out of Program	Entry Grade Level of Language Skills	Completion Grade Level of Language Skills	Hours Needed to Achieve	Hours Spent on PLATO Language Skills	Entry Grade Level of Math Skills	Completion Grade Level of Math Skills	Hours Needed to Achieve	Hours Spent on PLATO Math Skills	Hours Spent on PLATO Other Prog.
SAMPLE	i	X		X		5.5	7.5	30	5	5.4	7.6	30	4	3
	ii		X		X									
	iii		X	X		4.5	7.0	45	7	5.0	7.5	45	5	0
	iv	X			X									
	v	X			x									
	1													
	2													
	3													
	4													
	5													
	6													
	7													
	8													
	9													
	10													
	11													
	12													

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